rouse themselves to a sense of their duty and responsibilities, and to remember that the pauper inmates of the workhouse are human beings." These are brave words, and we thank the editor for them. If the Irish press in general would enter with us into the arena and fight for those who cannot fight for themselves, we should soon see something done to improve the condition of the Irish pauper. We note with pleasure that the official inspector has severely condemned the cells used by the lunatics; his strictures—more scathing than anything we ventured to publish—come with all the weight ot official censure.

MECHANICAL ROAD CARRIAGES: HORSEFLESH v. STEAM.

The possibility of substituting for the costly horse carriage a mechanical vehicle which will do the same work at a cheaper rate naturally appeals to the doctor, especially to the country doctor; and, indeed, that medical practitioners are alive to the importance of the question is shown by the number of inquiries on the subject which have been addressed to this office. We believe, therefore, that many of our readers will be grateful for a little information on the subject of mechanical carriages, and will like to know just how the matter stands at the present time.

Of the advantages of mechanical over animal traction there can be no question. The mechanical horse, unlike his living rival, only eats when he is at work. He does not want his meals served with regularity when he is at home in his stable. His food costs a great deal less. He is never sick or sorry, never tired. He will go on all day, and if need be all night. He does not require a stable. He does not grow ill or die. He will not run away. He does not deposit ordure on the roads. On the other hand, he may break down. He may even blow up. He wears out (though very slowly), and he requires a certain amount of skilled attendance.

All this is on the assumption that a good mechanical horse can be found, and probably the questions our readers most desire to have answered are: How far is mechanical power available; or, at least, what prospects are there that such power will be available before very long? What will be the probable cost? What are the chief difficulties in, or objections to, its use? What sort of power will be the most convenient? These questions we will try to answer, in at all events a summary fashion.

Legal Obstacles.

First of all there is the legislative question. Locomotive engines on common roads can (under the Highways Act) only travel at a very slow speed, preceded by a man with a flag. Their wheels must have 3-inch tyres, and there are certain other conditions intended to prevent the roads from being damaged or horses from being scared. If a mechanical carriage is a locomotive these provisions obviously prevent its being used on a highway. But is it? It certainly is not a vehicle of the class contemplated by the framers of the Act, and it seems quite possible that in law it would not come under the Highways Act at all. A strong argument against mechanical carriages being so classed is found in a clause of the Customs and Inland Revenue Act of 1888, which includes mechanically-propelled carriages in the list of vehicles for which a licence has to be taken out, thus placing them on the same footing as ordinary carriages, and removing them from the category of road locomotives and traction engines. However, the cases which have been decided up to the present are against this liberal view, and until they have been upset or until fresh legislation puts matters on a reasonable footing mechanical vehicles can only appear on our roads on sufferance.

Electricity as a Motive Agent.

Assuming these artificial hindrances to be cleared out of of the way, what is to be the character of the mechanical carriage of the future? There are practically three sources of power available—steam, oil, electricity. The last-named, if practicable, would be the most convenient of all, but in practice it has been found the least successful of all three systems. In the recent French trials the electrically-propelled carriage failed entirely, though most elaborate and costly preparations had been made by its proprietor. Possibly, where ready means exist of charging a storage battery, electricity might be used to drive a private carriage, but only in exceptional cases could such means exist, and then the carriage could never go more than a certain distance—say half a day's journey—from its station. Its battery once exhausted it would become as helpless as a steamer with a broken screwshaft, and nothing would remain but to tow it ignominiously home.

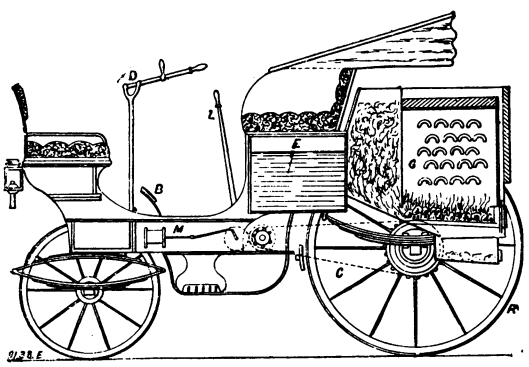
In the case of public vehicles, tramcars and omnibuses running from one charging station to another, the application of secondary batteries comes under different conditions, but these we are not concerned to discuss. As to primary batteries, no primary battery suited for work of this kind has as yet commended itself to the approval of electricians. The invention of one might go far to solve the question of mechanical road traction.

Oil Engines.

The successful competitors in France and the carriages recently shown by Sir David Salomons at Tunbridge Wells were all driven by oil engines, and the same class of motor is used in, at all events, the large majority of the vehicles now becoming popular in France and Germany. These engines are of the same type as the ordinary well-known gas engine, which is driven by a series of small explosions of mixtures of gas and air; but instead of gas they employ the vapour of light petroleum oil generated as required from a supply of such oil carried with the engine. They are by no means free from danger, and the benzolene which they require is a very unsafe material both to use and to store. The ordinary petroleum oil used for lighting purposes will not serve for the purpose. There is another form of oil engine, usually known as the naphtha engine, in which the oil vapour is used after the manner of steam in the steam engine, being condensed after it has served its purpose. These have been used both here and in America for the propulsion of launches; they are cheap, but more dangerous than the first mentioned class. We are not aware whether they have been tried for driving road carriages, but they are not likely to be so employed. All the oil engines give off an unpleasant smell of petroleum. They are of course absolutely free from smoke and steam. They can be started very quickly, as there is no delay for "getting up steam" as in the steam engine.

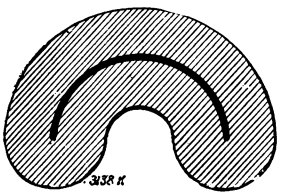
Steam Engines.

Notwithstanding these advantages, and the practical success these oil motors have attained, the tendency of expert opinion in this country seems to be in favour of steam. Engineers seem to believe that a small steam engine



can be constructed which will work as conveniently and as efficiently as the oil engine. The lightest and most efficient steam engine yet made is certainly the one constructed by Mr. Maxim for his flying machine, and it is quite possible that a motor of this class will prove the most suitable for road propulsion. The boiler for such an engine would be fired with petroleum such as is now used for lamps. For the present, however, the oil engine is the best motor available, though possibly the liberal prize offered for the best road carriage by *Engineering* may bring out something better. In order to give our readers an idea of the general arrangements of a mechanical carriage we reproduce (by the courtesy of the editor of *Engineering*, an illustration of a steam carriage in which the source of heat is coke.

The carriages of this pattern are designed and manufactured by MM. Serpollet, of Paris. The latest type of this carriage is shown in the diagram. The furnace and steam generator (G) is shown at the back. The reservoir of water is under the seat of the carriage. The steering apparatus, break, etc., are shown in the body of the carriage (D L B) near the hand. The boiler consists of a series of straight tubes of very thick steel having in section the form shown in our second figure. Water is admitted into these tubes at the



base of the boiler near the firegrate. Here it is almost immediately converted into steam, which becomes superheated as it passes through the upper tubes to the steampipe leading to the motor (M). Very little water is admitted into this boiler, but the tubes, on account of their great thickness, are able to retain so much heat as to render them unaffected by any temporary variations in the intensity of the fire. The iron casing round the boiler is lined by refractory brick to check radiation of heat. The carriage weighs about 13½ cwt. when empty, and will carry a load of four passengers at the rate of nine to fifteen miles, or even twenty-two on favourable gradients, so it is said. It consumes about 3½ lbs. of coke a mile, and uses about one-tenth of a pennyworth of lubricating oil in the same distance. It is stated not to make much noise, to give no smoke, and to show no steam except when the atmospheric conditions are very unfavourable.

The motor, whatever type be selected, may obviously be fitted to a carriage of any sort. A tricycle with added motor is spoken of as being a delightful form of conveyance. The rider may rely entirely on the engine, or he may use his feet as a supplementary source of power, or he can put the engine out of gear and work the tricycle in the ordinary way. At present the carriages which have been exhibited are rather expensive; £200 or £250 appears to be about their price; the cost of the tricycle is given at £52; but it must be remembered that they are more or less experimental, and the cost will drop considerably when they come to be produced in large numbers and on a manufacturing scale. The present price, moreover, is regulated not by the cost of production, but by the demand for a novel and fashionable toy. Probably it will not be a very inaccurate estimate to say that a carriage fitted with a motor will cost something about the same price, or rather less, than a similar carriage and the horse or horses required to draw it. The cost of working seems to be something like a penny a mile.

On the whole there seems to be every reason to believe that there will soon be available for general use several types of mechanical carriage, any one of which can be driven by a person without much mechanical knowledge or skill, some of which will be moderate in cost, and all of which will be much cheaper in working than similar carriages drawn by horse power. At present, however, the regulations of the Highways Act block the way, and till they are removed we shall probably have to content ourselves with looking on at the progress made in other countries.

A TEACHING UNIVERSITY FOR LONDON.

An influential deputation from institutions named in the report of the Royal Commission on the Gresham University waited, on November 28th, upon the Duke of Devonshire at the Privy Council Office, to urge that the Government should introduce at an early date a Bill similar to Lord Playfair's University Commission Bill, 1895, appointing a statutory Commission to carry out the recommendations of Lord Cowper's Commission, but with an added clause giving to all institutions or persons directly affected by any statute or ordinance proposed by the statutory Commission a right of appeal to the Privy Council.

Lord Kelvin introduced the deputation, whose views were enforced by Professor Rücker on behalf of the London University, Dr. Allchin for the Royal College of Physicians, Mr. Heath for the Royal College of Surgeons, Sir G. Young (University College), Dr. Wace (King's College), Dr. Frederick Taylor (Medical Schools), the Rev. Principal Whitehouse (Cheshunt College), Sir H. Roscoe, and Professor Silvanus Thompson.

The Duke of Devonshire, in reply, said that he had listened with the utmost attention to the views expressed by those who had spoken. He believed the deputation was a very representative one, but he must make one reservation in regard to the large body of students, drawn from the whole British Empire, who could never avail themselves of facilities for university teaching in London, but who had in the past obtained from the London University in its examining capacity valuable guidance in their studies, and a highly-valued recognition of their acquirements. They would not expect that he should on this occasion commit the Government to any course. He had desired to learn what were the views of the bodies represented on the deputation, and it was equally his duty to obtain if possible an expression of opinion from the body of external students he had referred to. The Duke proceeded to refer to the differences of opinion on the scheme of a teaching university which had appeared in the Convocation of London University. He expressed the opinion that it would be a rather strong proceeding, that in order to create a teaching university a constitution should be imposed on the existing University against the will of Convocation, which, under its existing charter, possessed the right of imposing a veto on any alteration in its constitution. Professor Thompson said there was a majority of two to one in Convocation in favour of the scheme of a Statutory Commission. The Duke referred to certain amendments to the scheme which he understood were advocated by a majority of the existing graduates, and urged the expediency of doing everything that was possible to reconcile this opposition. If a Bill on the subject were presented to Parliament it was extremely desirable that it should come in a shape which would excite as little opposition as possible.

THE ANNIVERSARY CELEBRATIONS OF THE ROYAL SOCIETY.

Addresses by Lord Kelvin and Sir Joseph Lister.

On Saturday, November 30th, St. Andrew's Day, the anniversary meeting of the Royal Society was held at Burlington House. The auditors of the Treasurer's accounts having read their reports, and the Secretary having read the list of Fellows elected and deceased since the last annual meeting, Lord Kelvin, the President, proceeded to deliver his address. Of four of the deceased members, Cayley, Neumann, Huxley, and Pasteur, he made special mention. Of the late Professor Huxley, the President spoke as follows: "The death of Huxley, one of my predecessors in the presidential chair of the Royal Society, takes from us a man who can ill be spared. During the fifty years since he sailed from England as assistant surgeon on board H.M.S. *Rattlesnake*, bound for a surveying expedition in the southern seas, he had been a resolute and untiring searcher after truth, and an enthusiastically devoted teacher of what he learned from others and what he discovered by his own work in biological science. His first contribution to science was a short note, communicated while he was still a student in the Charing Cross Hospital to the *Medical Times and Gazette*, describing a structure in the root sheath of hair, which has since borne the name of 'Huxley's layer.' It was followed by papers on the blood corpuscles of the amphioxus lanceolatus and on the anatomy and affinities of the family of medusæ, for the British Association and the Royal Society; and several other articles on various biological subjects, all describing some of the work of the leisure left him by his medical duties during his four years' cruise on board the *Rattlesnake*, which were sent home by him to England and published during his absence. It is to be hoped that the long series, thus so well begun, of papers describing skilful and laborious research by which knowledge was increased in every department of biology, will be given to the world in collected form as soon as possible. Even these purely